Small Business Innovation Research/Small Business Tech Transfer

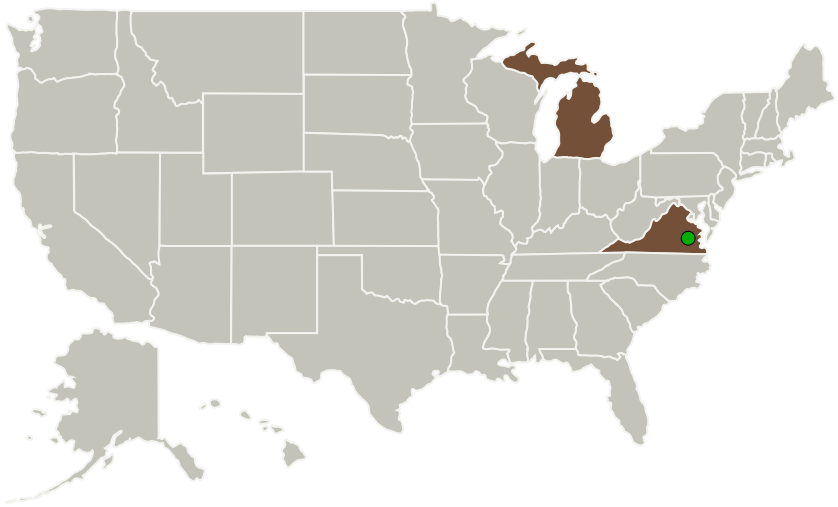
Miniaturized Time Domain Terahertz Non Destructive Evaluation for In-Orbit Inspection of Inflatable Habitats and Thermal Protection Systems, Phase II

Completed Technology Project (2012 - 2014)

Project Introduction

Picometrix's time-domain terahertz (TD-THz) non-destructive evaluation (NDE) technology could be used to inspect space flight structures such as inflatable space habitats, thermal protection systems (TUFI-type tiles, SOFI TPS), for voids, disbonds, and damage such as tearing and micron-meteorite impact. The current instrumentation paradigm is that a multi-purpose TD-THz control unit is used to provide common drive, data acquisition, and analysis functionality to interchangeable sensors and imaging which connect to the control unit with a fiber-optic/electrical umbilical. However, the current COTS control unit is substantially larger and heavier than would be desirable for a space-flight capable unit. In Phase II we will construct a prototype compact TD-THz control unit with a fiber optically coupled remote compact TD-THz reflection tomography sensor based on the Phase I designs. At the end of a successful Phase II, and transitioned into Phase III, we envision that a hand-held A or B-Scan NDE imager could attach to a control unit, sufficiently robust for spaceflight, no larger than a shoebox. In Phase II, it should be possible to reduce the size of the control unit to approximately 1/3 of the current values to, for example, 14 in. X 10 in. X 4 in. and 15 pounds.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Picometrix, LLC	Lead Organization	Industry	Ann Arbor, Michigan
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Michigan	Virginia

Project Transitions

April 2012: Project Start

April 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138310)*

Images

Project Image

Miniaturized Time Domain Terahertz Non Destructive Evaluation for In-Orbit Inspection of Inflatable Habitats and Thermal Protection Systems *(https://techport.nasa.gov/image/133473)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Picometrix, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Zimdars

Co-Investigator:

David Zimdars

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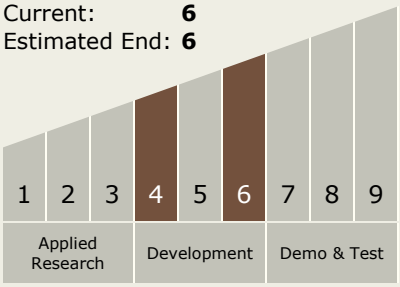
Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.5 Nondestructive Evaluation and Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System